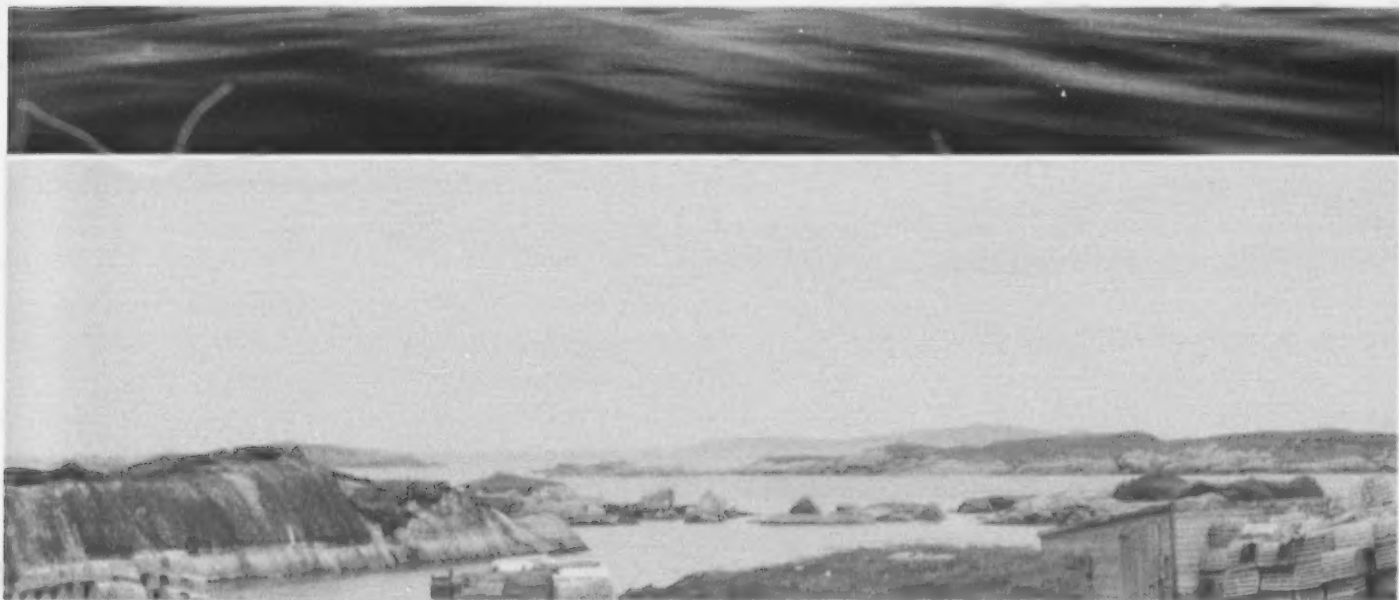




Fisheries and Oceans
Canada

Pêches et Océans
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IQ Fisheries in Canada
Linking Business Outcomes to Management Practices

STATISTICAL AND ECONOMIC ANALYSIS SERIES

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IQ Fisheries in Canada
Linking Business Outcomes to Management Practices

GSGislason & Associates Ltd.
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ABSTRACT

Many commercial fisheries in Canada are managed under individual quota (IQ) systems whereby licence holders receive a predetermined share of the total allowable catch or TAC. And many of these fisheries allow transfers of catch entitlements, on a temporary or permanent basis i.e., the fishery is managed as an individual transferable fishery.

The study analyzes the role of fisheries management in the business success of individual quota fisheries in Canada. The study adopts a case study approach in: a) identifying key fisheries management measures in place e.g., transferability provisions; and b) identifying indicators of business success for each fishery e.g., EBITDA, and linking these business indicators to the management measures. The six case study fisheries include Pacific halibut, Pacific geoduck, Pacific sardine, Newfoundland snow crab, Bay of Fundy scallops and Gulf of St. Lawrence shrimp, and encompass a variety of vessel sizes, fishing technology, and processed product forms.

FOREWORD

Fisheries and Oceans Canada commissioned the report *IQ Fisheries in Canada: Linking Business Outcomes to Management Practices* to better understand the benefits and limits that individual quotas provide for Canadian fishers. The report, prepared by GSGislason & Associates Ltd., compares the business outcomes of fishers in six Canadian fisheries that are managed with individual quotas. The case studies reflect the diversity of quota management in Canada. Some of the case study fisheries allow for transferability of quota, with more or less limits on the transfers. All the fisheries differ from each other with respect to the species fished and the other fishery management conditions in place (e.g. gear restrictions, fishing grounds, vessel size limits, etc.). By comparing the different fisheries, the report is able to investigate how the differences in the quota management approaches may affect the business outcomes for fishers.

The report has been reviewed by a number of subject experts, who have provided an additional level of consideration to the analyses and conclusions. The reviewers are fishery economists from academia or Fisheries and Oceans Canada with expertise in quota management of fisheries and in one or more of the case study fisheries. The reviewer comments are included as an annex and, when read alongside the case studies, invite the reader into a discussion about the effects of quota management in these six fisheries and the methodological approach of the study.

Together, the paper and reviewer comments contribute to the ongoing evidence-based discussion about the impacts of quota-based management systems in Canadian fisheries.

Robert Elliott

Director General, Economic Analysis and Statistics
Fisheries and Oceans Canada

Ottawa, Ontario, August 8, 2012

Preface

Fisheries & Oceans Canada retained GSGislason & Associates Ltd. to conduct an analysis of the linkages between business outcomes and management practices for Individual Quota (IQ) fisheries in Canada.

The consultants have benefited from discussions with industry and government. Notwithstanding this assistance, the consultant has final responsibility for the analyses and conclusions of the study.

Acronyms

BC	-	British Columbia
DFO	-	Fisheries and Oceans Canada
EBITDA	-	Earnings Before Interest, Taxes, Depreciation & Amortization
EI	-	Employment Insurance
FN	-	First Nations
IFMP	-	Integrated Fisheries Management Plan
IQ	-	Individual Quota
ITQ	-	Individual Transferable Quota
kg	-	kilogram
m	-	metre
NBV	-	Net Book Value
NL	-	Newfoundland & Labrador
TAC	-	Total Allowable Catch

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1.0 Introduction

Many commercial fisheries in Canada are managed under individual quota (IQ) systems whereby licence holders receive a predetermined share of the total allowable catch or TAC. And many of these fisheries allow transfers of catch entitlements, on a temporary or permanent basis i.e., the fishery is managed as a individual transferable quota (ITQ) fishery.

Some IQ fisheries are very successful in the business sense that net returns have increased because of higher catches, higher prices or lower tangible fishing costs. However, others have been less successful.

There is a need to identify how different management measures or characteristics contribute to the commercial/business outcomes for IQ fisheries.

1.1 Study Objectives

This study analyzes the role of fisheries management in the business success of individual quota fisheries in Canada. The study adopts a case study approach in:

- identifying key fisheries management measures in place e.g., transferability provisions, and
- identifying indicators of business success for each fishery e.g., EBITDA, and linking these business indicators to the management measures.

EBITDA is Earnings Before Interest, Taxes, Depreciation & Amortization and is a measure of capital returns, without the effects of financing, accounting and tax decisions, that can be used to analyze and compare profitability among business sectors.

1.2 Benchmark Business Returns for Fishing Fleets

For the fishing industry, we suggest a benchmark EBITDA return of at least 25% of revenues (where the value of owner-operator labour is included as a cost and the cost of leasing licences, quota and other fishing assets are not deducted as a cost i.e., the return represents a pure return to capital).

Investors in small and medium-sized business typically require an EBITDA (operating income) return of between 15% and 30% on assets. Fishing is a relatively risky business, suggesting that a return above the minimum should be obtained – accordingly we propose that this minimum return should be 20% to 25% of Net Book Value (NBV) of assets based on experience in a variety of resource and non-resource sectors.

Unfortunately, the NBV of fishing assets – vessels plus licences/quotas – is not available. However, we suggest that the 20% to 25% target EBITDA return on assets translates into about a 25% return on landed value, assuming the market value of assets is 5 to 6 times landed value and NBV of assets is about 20% of market value of assets, based on the relationships among landed value, market value of assets, NBV of assets and target return for West Coast fishing fleets in GSGislason (2004) p. 91-93.

That is, the benchmark viability benchmark used in the analysis is an EBITDA of 25% of landed value. Admittedly, this is somewhat arbitrary.

1.3 Case Study Individual Quota (IQ) Fisheries

In consultation with Canada Department of Fisheries & Oceans (DFO), we chose the following six (6) fisheries for analysis. The fisheries differ in terms of harvest technology, species focus and product forms and value.

Table 1.1 Six (6) Individual Quota case study fisheries

Fisheries Description	Case Study Fisheries					
	Pacific Halibut	Pacific Geoduck	Pacific Sardine	Nfld Snow Crab	Full Bay Scallops	Gulf Shrimp
Fishing Technology	longline	dive	seine	trap	dredge	trawl
Number of Licences 2010	435	55	50	3,439	99	112
IQ Implementation Year	1991	1989	2002	1995	1997	1991 & 1996**
Main Product Form	fresh whole	live	frozen whole	frozen sections	fresh meats	frozen whole
Type of Fishery	low volume/ high value	low volume/ high value	high volume/ low value	high volume/ mid value	low volume/ high value	high volume/ low value
Typical Vessel - length	12.2m-24.4m	10.7m-18.3m	19.8m-25.9m	7.6m-19.8m	13.7m-19.8m	16.7m-27.4m
- weeks fished	~4	8-12	~6	~8	15-20	~20
- crew size*	3 to 4	~3	4 to 5	2 to 6	~4	4 to 5

* including captain or skipper

** the Group A part of the Gulf Shrimp fleet went to IQs in 1996, the Group B part went to IQs in 1991

The information base for the study included available data and reports (see Bibliography), and interviews with DFO officials and with industry. All values in the study are expressed in nominal dollars.

1.4 Commercial Fishing Licences and Transferability

The Federal Minister of Fisheries and Oceans has absolute discretion to issue, reissue, cancel or amend a commercial fishing licence. The licensee essentially receives a limited fishing privilege, subject to the terms and conditions on the licence, rather than any kind of absolute or permanent right or property.

A fishing licence is not owned by the person to whom it is issued; rather, it is the property of the Crown. Strictly speaking, licences can not be transferred or sold, but in actual practice they do change hands. A person who wishes to transfer his or her licence relinquishes it to DFO and identifies the entity to whom a replacement licence is to be issued. DFO will then issue the replacement licence to the entity named by the current licence holder (GSGislason 2004).

Each case study fleet has several First Nations commercial licences that are "party-based". A party-based licence is a licence issued to an individual, company or First Nation that is designated on an annual basis to an eligible vessel to fish the licence. Party-based licences may be transferred temporarily in-season to any other licence holder. First Nations licences can not be transferred permanently.

2.0 Pacific Halibut

Pacific halibut is a large flatfish generally weighing between 5 kg to 45 kg at harvest. The commercial halibut fishery in Pacific Canada is a hook & line fishery operating under the "L" licence category. Halibut vessels generally are in the 12.2 m (40 feet) to 24.4 m (80 feet) length range.

Halibut is dressed on-board but not headed until arriving at the processing plant. The majority of halibut is sold as fresh, gutted whole fish into the US market - see profile in Table 2.2 and GSGislason (2008).

2.1 Management Regime

The halibut fishery became a limited entry fishery with 435 licences in 1979. In 1991 the fishery transformed into an Individual Quota (IQ) fishery - the initial allocation per vessel was based on a combination of recent catch history and vessel length (70% catch history and 30% vessel length).

There are no owner-operator or fleet separation clauses i.e., the licence holder does not need to be on the vessel while it fishes and the licence holder can be an individual or a company (including a processing company).

The non-aboriginal L licence is vessel-based whereas the aboriginal FL licence is party-based.

For the first two years of the IQ program, quota consolidation of more than one quota on a single vessel was not permitted. But gradually consolidation and transferability rules were relaxed:

- in 1993, IQs were made transferable on a temporary (1 year) basis - each halibut quota split into two shares, licence holders could transfer one or two shares for the season, a licenced vessel could have at most four shares
- in 1999, both temporary and permanent transfers were allowed with 1) no one vessel having more than 1% of the TAC, and 2) each licenced vessel maintaining a minimum amount of permanent IQ of .01149% of the TAC (or 5% of the average initial allocation for the 435 licenced vessels) - but the minimum could be temporarily reallocated for the year. Licences with only the minimum amount of permanent quota often are called "empty L" licences (there are close to 100 empty L licences today).

Allowable transfer amounts moved from quota blocks to a share of the TAC in 1999 (the minimum amount that could be transferred was the percentage that corresponds to 0.45 kg or one pound).

The 1% holdings limit applies to vessels not licence owners i.e., an entity can own two vessels each with 1% of the TAC (the 1% limit also applies to First Nation licences).

There are several groundfish fleets other than the halibut fleet. Prior to 2006, the five fleets were managed separately and one fleet's directed species could be another fleet's discards by regulation e.g., the halibut fleet could only retain a limited amount of rockfish whereas the rockfish fleet could not retain and had to discard halibut.

The Groundfish Integration Program was launched in 2006 to integrate the various groundfish fisheries under one policy framework entailing:

- Individual Quota (IQ) management for each of the fisheries,
- 100% at-sea monitoring of each vessel using observers or cameras (there had been 100% dockside monitoring of landings of all five fleets for some time), and
- transferability of quotas within and among fleets to address bycatch requirements.

The intent was to make each individual enterprise responsible for all their catch regardless of disposition, retention or discard.

2.2 Business Outcomes

The BC halibut fleet has been economically viable under the IQ management program launched in 1991. The much longer season and a slower harvest have resulted in a much greater share of halibut being directed to the fresh market where the fish commands a price premium over the frozen product. Available evidence suggests that the halibut fleet has had an EBITDA (Earnings Before Interest, Taxes, Depreciation & Amortization) in excess of 25% revenues.

Table 2.1 Performance & management measures in the Pacific Halibut Fleet (1991-2009)

Performance/Management	Halibut Fleet			
	1991	1994	2007	2009
EBITDA to Revenues	22%	41%	~65%	~60%
IQ - Transferable?	No	temporary only	temporary & permanent	temporary & permanent
- Divisible?	not applicable	limited	fully divisible	fully divisible
- Limit on Holdings per Vessel - Temporary IQ?	not applicable	Yes	Yes	Yes
- Permanent IQ?	not applicable	not applicable	1% of TAC	1% of TAC

Source: EBITDA - Gislason (1997) plus adjusted results from Nelson (2009) & Nelson (2011) e.g., used improved landed prices

Moreover, economic returns and EBITDA have improved with the relaxation of transferability restrictions from 1993 onwards. The number of active vessels has decreased by two thirds, and the number of deliveries or landings events per active vessel has increased.

With the decline in halibut TAC and catch in recent years, the 1% of TAC limit on permanent quota holdings can be constraining to those who want to acquire additional quota to maintain vessel catch levels.

The lack of security of IQ allocations has created business uncertainty in the commercial halibut industry e.g., the Minister recently changed the commercial:recreational split of the overall halibut TAC.

There are 87 aboriginal FL halibut licences within the 435 licence total. Halibut licences are attractive to First Nations not only because halibut is a high priced species, but also because the transferability provisions allow flexibility in reaping benefits e.g., a First Nation licence holder can either fish the quota or lease the quota, for a fee, to another licence holder.

Table 2.2 Pacific Halibut commercial fishing fleet profile from 1980 to 2010

Year	Regulations*			Activity****		Vessel Landings			Wholesale Value	
	TAC tonnes (1)	Season Length (2)	Licences (3)	Active Vessels (4)	Vessel Deliveries (5)	Tonnes** (6)	\$ millions Value (7)	\$ per kg (8) = (7)/(6)	\$ millions (9)=(6)x(10)	\$ per kg*** (10)
1980	2,715	65 days	435	333		2,563	7.0	2.75		
81	2,190	58 "	435	337		2,565	7.6	2.95		
82	2,453	61 "	435	301		2,506	7.0	2.79	9.8	3.90
83	2,409	24 "	435	332		2,466	8.4	3.42	11.6	4.70
84	4,073	22 "	435	305		4,107	9.5	2.32	14.8	3.60
85	4,554	22 "	435	334		4,712	13.8	2.93	19.3	4.10
86	5,124	15 "	435	363		5,092	22.7	4.46	29.8	5.85
87	5,255	16 "	435	417		5,555	28.9	5.20	33.1	5.95
88	5,737	14 "	435	424		5,832	23.1	3.96	30.0	5.15
89	4,554	11 "	435	435		4,731	19.0	4.01	23.9	5.05
1990	3,548	6 "	435	435		3,889	21.7	5.57	26.4	6.80
91*	3,357	214 "	435	433	1,173	3,262	21.6	6.65	24.0	7.35
92	3,629	238 "	435	431	1,150	3,459	21.7	6.27	21.4	6.20
93	4,826	245 "	435	351	1,255	4,821	30.2	6.26	34.5	7.15
94	4,554	260 "	435	313	1,148	4,496	37.4	8.32	41.6	9.25
95	4,378	246 "	435	294	1,177	4,366	34.0	7.79	38.2	8.75
96	4,370	246 "	435	281	1,094	4,335	34.1	7.87	40.1	9.25
97	5,707	246 "	435	279	1,211	5,634	41.6	7.38	51.0	9.05
98	5,912	246 "	435	288	1,335	5,847	30.9	5.28	41.8	7.15
99	5,543	246 "	435	265	1,284	5,540	38.7	6.99	50.7	9.15
2000	4,874	246 "	435	238	1,048	4,822	42.5	8.82	51.8	10.75
01	4,809	246 "	435	234	989	4,629	37.3	8.05	52.1	11.25
02	5,498	246 "	435	214	1,028	5,437	48.0	8.82	57.6	10.60
03	5,386	260 "	435	225	1,072	5,317	49.2	9.25	54.0	10.15
04	5,756	261 "	435	218	1,072	5,482	51.4	9.38	61.1	11.15
05	5,688	262 "	435	221	1,123	5,556	50.2	9.05	62.5	11.25
06	5,311	256 "	435	182	912	5,317	51.0	9.60	68.9	12.95
07	4,372	251 "	435	181	765	4,240	46.7	11.00	60.2	14.20
08	3,513	253 "	435	168	726	3,290	35.5	10.80	47.6	14.45
09	3,005	240 "	435	154	610	2,777	28.5	10.25	35.5	12.80
2010	2,850	255 "	435	154	594	2,793	34.2	12.20	41.9	15.00

* Fisheries Management Regimes - limited entry pre 1991, IQs 1991 onwards (transferability allowed 1993 onwards)

** Dressed head off weight (conversion factor of 0.75 from whole weight to dressed head off weight)

*** \$ per kg dressed head-off weight equivalent

**** Each vessel fishes only a few weeks but the fleet delivers halibut over the full 8-9 month season

Source: Regulations, Activity & Vessel Landings - GSGislason (2008), DFO, GSGislason estimates
Wholesale Prices - GSGislason (2008) and BC Agriculture information on processed product quantities & values

3.0 Pacific Geoduck

Pacific geoduck is a large burrowing clam that generally weighs between 0.5 and 1.5 kg at harvest. The commercial geoduck fishery in Pacific Canada is a dive fishery operating under the G licence category 12 months a year. Geoduck dive vessels generally are 10.7 m (35 feet) to 18.3 m (60 feet) in length.

The vast majority of geoduck is sold as live product into the Hong Kong and Mainland China markets - see Table 3.2, GSGislason (2008) and GSGislason (2012) for a profile of the fishery.

3.1 Management Regime

The geoduck fishery became a limited entry fishery with 55 licences in 1981. In 1989 the fishery transformed into an Individual Quota (IQ) fishery - each of the 55 licence holders received an equal 1.818% share of TAC.

There are no owner-operator or fleet separation clauses i.e., the licence holder does not need to be on the vessel while it fish and the licence holder can be an individual or a company (including a processing company).

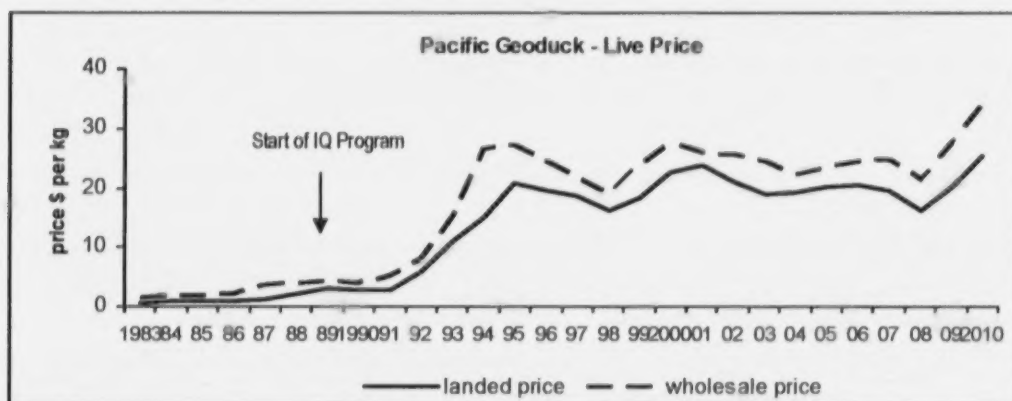
The non-aboriginal geoduck G licence is vessel-based whereas the aboriginal geoduck FG licence is party-based.

In 1989 at the outset of the IQ program, temporary transfers in-season only were allowed and the complete quota block had to be transferred i.e., permanent transfers were not allowed.

However, starting in 2012 each quota could be divided into 10 equal parts i.e., there became 550 equal quota shares with each G licence holder having 10 shares at the start of the season. Each of the 550 quota shares can be transferred on a temporary or permanent basis.

At one time, there was a limit of three G licences that one entity could fish - this was changed to five G licences about 5 years ago. Today, the concentration limit is still five G licences or 50 quota share units. A vessel with 50 quota units would have 5 licences on the vessel each with 10 units rather than one licence with 50 quota units.

Chart 3.1 Live price of Pacific Geoduck from 1993 to 2010



3.2 Business Outcomes

The BC geoduck fleet has been economically viable under the IQ management program launched in 1989, and in fact is one of the strongest if not the strongest economic sector of the BC fishery. The IQ system has allowed industry to serve the lucrative live market year round and prices increased dramatically (see Table 3.2).

The box below demonstrates that the geoduck fleet consistently has had an EBITDA (Earnings Before Interest, Taxes, Depreciation & Amortization) in excess of 30%, and even in excess of 60% recently - this EBITDA return is substantially above the 25% benchmark.

Table 3.1 Performance & management measures in the Pacific Geoduck Fleet (1991-2009)

Performance/Management	Geoduck Fleet			
	1991	1994	2007	2009
EBITDA to Revenues	33%	56%	~65%	~65%
IQ - Transferable?	temporary only	temporary only	temporary only	temporary only
- Divisible?	No	No	No	No
- Limit on Holdings per Vessel - Temporary IQ?	No	No	No	No
- Permanent IQ?*	3 quotas	3 quotas	5 quotas	5 quotas

* each standard quota block corresponds to 1/55 or 1.818% of the TAC

Source: EBITDA - Gislason (1997) plus adjusted results from Nelson (2009) & Nelson (2011) e.g., used improved landed prices

There has been a modest 30% decrease in the number of active vessels with the limited transferability provisions in place prior to 2012. The geoduck TAC has been caught in each year. The major factor underlying the exceptional financial performance of the geoduck fleet is the very high price for the live product.

The high cost of purchasing a geoduck G licence in excess of \$2 million each has inhibited new individuals, including First Nations interests, from entering the fishery. The primary rationale for the portioning of each G licence into 10 equal shares in 2012 was to facilitate the entry of First Nations to the fishery.

Table 3.2 Pacific Geoduck commercial fishing fleet profile from 1983 to 2010

Year	Regulations*		Activity			Vessel Landings			Live Product	
	TAC tonnes (1)	Licences (2)	Active Vessels (3)	Divers (4)	Diver Hours (5)	Tonnes** (6)	\$ millions Value (7)	\$ per kg (8)=(7)/(6)	% Sales (9)	\$ per kg (10)
1983	2,948	54	53			2,635	1.8	.68	9%	1.65
84	2,994	54	44			3,484	2.9	.84	11%	1.70
85	2,971	55	52			5,370	4.7	.88	11%	1.70
86	3,980	55	55			5,005	4.3	.86	18%	2.05
87	4,239	55	55			5,735	6.2	1.08	15%	3.60
88	3,890	55	55			4,567	9.8	2.14	18%	4.10
89*	3,992	55	47	176	18,070	3,904	12.3	3.15	26%	4.30
1990	3,992	55	44	145	19,500	3,958	10.6	2.67	29%	4.10
91	3,368	55	44	133	17,210	3,234	9.2	2.84	47%	5.15
92	2,863	55	41	135	14,750	2,852	16.1	5.65	53%	7.85
93	2,432	55	44	112	13,050	2,422	26.7	11.00	76%	15.20
94	2,245	55	44	110	12,400	2,227	33.7	15.11	80%	26.50
95	2,096	55	42	108	11,330	2,085	43.0	20.64	83%	27.15
96	1,841	55	44	94	10,640	1,842	36.0	19.56	88%	24.45
97	1,796	55	42	91	11,820	1,796	33.2	18.51	92%	21.75
98	1,796	55	42	88	10,700	1,797	29.3	16.29	93%	18.80
99	1,796	55	41	93	10,790	1,797	32.9	18.30	96%	23.90
2000	1,796	55	42	92	10,860	1,797	40.7	22.67	95%	27.45
01	1,821	55	40	91	10,610	1,821	43.5	23.87	96%	25.90
02	1,821	55	40	96	10,780	1,822	38.5	21.13	96%	25.65
03	1,721	55	41	93	10,050	1,724	32.8	19.03	97%	24.50
04	1,796	55	40	95	10,070	1,797	34.4	19.13	98%	22.35
05	1,559	55	40	83	8,260	1,560	31.7	20.30	98%	23.65
06	1,559	55	39	85	8,960	1,560	32.2	20.61	99%	24.30
07	1,559	55	40	85	8,578	1,560	30.6	19.62	96%	24.75
08	1,559	55	39	76	8,273	1,559	25.2	16.16	99%	21.45
09	1,559	55	39	77	8,639	1,560	31.2	20.02	99%	27.50
2010	1,559	55	40	76	8,540	1,560	39.3	25.22	99%	34.05

* Fisheries Management Regimes - limited entry pre 1989, IQs 1989 onwards (transferability allowed since 1989)

** Live weight

Source: GSGislason (2008), DFO Catch Stats and BC Agriculture information on processed product quantities & values

4.0 Pacific Sardine

Pacific sardine is a small pelagic fish typically weighing between 0.3 to 0.7 kg at harvest. There was a substantial sardine fishery along the Pacific coast during the first half of the 20th century but then the resource disappeared from Canadian waters for several decades. The fish reappeared in the late 1990s.

The commercial fishery in Pacific Canada recommenced thereafter using seine gear under the "ZS" licence category. Sardines are caught by seine vessels generally in the 19.8 m (65 feet) to 25.9 m (85 feet) range.

The majority of sardine is sold as frozen whole fish into European and Asian markets for food or as bait - see Table 4.2 and GSGislason (2011) for a profile of the fishery.

4.1 Management Regime

The sardine fishery of the late 1990s started as an experimental fishery. In 2002 the fishery transformed into a formal commercial fishery under Individual Quota (IQ) management - each of the 50 licence holders received an equal 2% share of the TAC.

There are 50 licences available each year - 25 commercial licences issued to individuals on a permanent basis and 25 commercial licences issued to First Nations applicants on a year-by-year basis i.e., First Nations have to apply for the licences each year.

Owner-operator or fleet separation clauses are not applicable to the sardine fishery i.e., a licence holder does not need to be on the vessel while it fishes and the licence holder can be an individual or a company (including a processing company).

In fact, licences are party based and not attached permanently to any particular vessel length. The licence holder - an individual, corporation or First Nation - each year designates the licence to a vessel, of any length, to fish the quota.

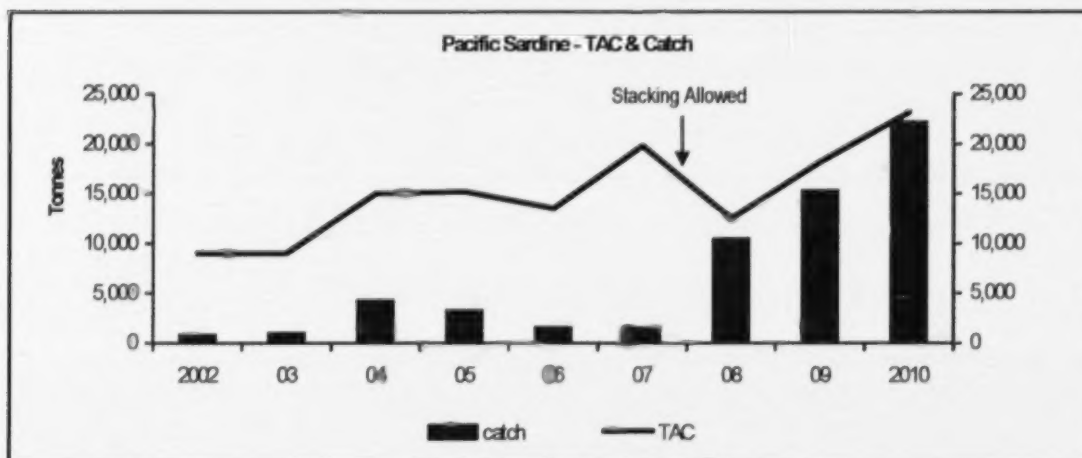
Initially quotas could not be transferred.

Since 2008 a vessel owner may fish more than one quota through acquiring, leasing or stacking licence privileges temporarily from another licence holder, individual or First Nation, for the year. Prior to 2008, stacking of more than one licence on a vessel was not allowed.

There is no limit as to how many licences/quota a vessel may fish in a year.

However, when licences are transferred, temporarily to another vessel via licence stacking or permanently to another licence holder via licence nomination, the whole quota is transferred.

Chart 4.1 TAC and catch of Pacific Sardine, in tonnes, from 2002 to 2010



4.2 Business Outcomes

The BC sardine fleet has been economically viable since the 2008 stacking provision allowed a vessel to fish more than one licence with quota.

The box below indicates that after 2009 the sardine fleet has had an EBITDA (Earnings Before Interest, Taxes, Depreciation & Amortization) equal to the 25% of revenues benchmark.

Table 4.1 Performance & management measures in the Pacific Sardine Fleet pre2008-2009

Performance/Management	Sardine Fleet	
	Pre 2008	2009
EBITDA to Revenues	≤10%	25%
IQ - Transferable?	No	temporary only
- Divisible?	not applicable	No
- Limit on Holdings per Vessel - Temporary IQ?	not applicable	No
- Permanent IQ?	not applicable	not applicable

Source: GSGislason (2011)

Prior to the 2008 introduction of the stacking provision, only 10-20% of the annual TAC was caught since many licence holders found it uneconomic to fish – the costs of operating seine vessels are high.

Stacking of licences has allowed those vessels fishing to reap benefits through economies of scale i.e., a vessel fishing one licence/quota is not a viable operation - an operation needs a high volume to be profitable as the price is very low at under \$0.25 per kg.

Stacking also has allowed First Nations licence holders to earn revenues from leasing out licence privileges.

Table 4.2 Pacific Sardine commercial fishing fleet profile from 2002 to 2010

Year	Regulations*		Activity		Vessel Landings			Processed Product	
	TAC tonnes (1)	Licences (2)	Active Vessels (3)	Vessel Days Fished (4)	Tonnes** (5)	\$ millions Value (6)	\$ per kg (7) = (6)/(5)	\$ millions (8)	\$ per kg (9)
2002*	9,000	14	9	93	822	0.3	0.33	1.4	1.70
03	9,000	50	9	70	1,006	0.3	0.26	0.9	0.90
04	15,000	50	23	199	4,259	1.3	0.31	3.8	0.90
05	15,200	50	16	181	3,266	0.7	0.21	3.1	0.95
06	13,500	50	15	65	1,558	0.5	0.31	1.4	0.90
07	19,800	50	10	64	1,524	0.3	0.18	1.4	0.90
08	12,491	50	20	288	10,435	2.3	0.22	11.5	1.10
09	18,196	50	17	388	15,334	2.5	0.17	15.3	1.00
2010	23,166	50	13	444	22,223	3.7	0.17	22.2	1.00

* Fisheries Management Regimes - experimental fishery pre 2002, IQ commercial fishery 2002 onwards (transferability allowed 2008 onwards)

** Round weight

Source: GSGislason (2011). DFO Catch Stats and BC Agriculture information on processed quantities & values

5.0 Newfoundland Snow Crab

The commercial snow crab fishery in Newfoundland and Labrador (NL) is a trap fishery prosecuted by vessels mainly of 7.6 m (25 feet) to 19.8 m (65 feet) in length.

Snow crab is delivered live to the processing plant. The vast majority of processed product from the plant is sold as frozen sections to the United States or China (further processing occurs in China) - see Table 5.3 and Canada Fisheries & Oceans (2009) for a profile of the fishery.

5.1 Management Regime

Snow crab fisheries started in the 1970s along the northeast coast and gradually expanded to other regions. The Integrated Fisheries Management Plan (IFMP) outlines the development of the fishery (Canada Fisheries & Oceans 2009).

Individuals who fished prior to the expansion of the fishery in the 1980s were designated as "fulltime licence" holders, virtually all having vessels in the 50' to 64' 11" range (15.2 to 19.8 m).

Several supplementary fisheries and "supplementary licences" for snow crab were implemented in 1987 - the intent was to supplement incomes negatively affected by declines in the groundfish resources (licence holders utilize vessels in the length range of 35' to 64' 11" or 10.7 to 19.8 m).

DFO first issued temporary seasonal snow crab permits to operators of vessels under 35' or 10.7 m in 1995 - the intent was to provide economic opportunities to small boat enterprises in light of declining groundfish resources and increasing snow crab resources and TACs. In 2003 DFO converted the temporary permits into regular licences under the "inshore licence" category.

Fishing regulations can vary by type of licence and by each of the approximately 10 fishing areas. The mid East Coast of Area 3K piloted an individual quota system in 1995. In 1996 this pilot was extended to all areas except Area 2J, an area with less than 5% of all snow crab licences. Shortly thereafter, all snow crab fishing regions had gone to IQ management - within each area and fleet type, each licence holder received the same initial quota.

There are Owner-Operator and Fleet Separation Policies for vessels in the less than 65" vessel category in Newfoundland and Labrador. The Owner-Operator Policy requires that a licence holder fish the licence personally and be on board the vessel unless a designated operator has been approved. The Fleet Separation Policy prevents inshore fishing licences from being issued to corporations, including corporations in the processing sector. An exception to this policy was introduced in 2011 whereby Independent Core fish harvesters may hold licences in the name of their wholly-owned company (DFO 2011).

Table 5.1 Licence categories for the Newfoundland Snow Crab Fishery in 2010

Licence Category	2010		
	TAC	Catch*	No. Licences
Fulltime	7,646	8,123	71
Supplementary**	34,731	31,244	766
Inshore	<u>13,710</u>	<u>12,863</u>	<u>2,602</u>
	56,087	52,230	3,439

* may not agree with other estimates due to rounding

** includes any exploratory & other licences

Source: DFO "Species Quota Report", NL Snow Crab 2010

Under a strict owner-operator clause, there can be no quota transfer and consolidation of fishing privileges.

Starting in the 1990s with the inception of the inshore fleet, a partnering approach was introduced, known as buddy-up, whereby two licence holders may fish together on one vessel while both licence holders, or their designate if approved, must be on board while fishing.

In 2006, the buddy-up option was adopted temporarily for the over 40' or 12.2 m fleet (formerly over 35' or 10.7 m fleet) as well.

In 2008 DFO introduced the "enterprise combining" policy whereby a fishing enterprise could purchase permanently the snow crab quota entitlement of another person in the area so long as: 1) all licences held by the selling enterprise were transferred and the selling enterprise removed or retired its vessel registration, and 2) the purchasing enterprise acquired at most two times the individual quota level.

5.2 Business Outcomes

Since the late 1990s, the number of active vessels has declined by a third and the number of deliveries or landings events has declined by a half - see Table 5.3. The result is a significant increase in landings per active vessel.

However, revenues per vessel do not show the same trend as prices have declined due to weakened market conditions. The fleet rationalization to date, however has allowed the smaller fleet to remain in business in spite of the challenging conditions.

We also note that the fleet rationalization program, involving permanent quota transfers, only commenced in 2008 - the consolidation of IQs and the decline in vessel participation is expected to continue. The permanent quota transfer feature allows the fleet to adjust to market, cost and other conditions e.g., product prices, fuel prices.

Only limited Cost & Earnings Survey data is available publicly for the Newfoundland snow crab fleet, specifically for the year 2004 which saw the highest snow crab price on record - see Table 5.3.

Table 5.2 Performance & management measures in the Newfoundland Snow Crab Fleet in 2004

Performance/Management	Snow Crab Fleet 2004	
	Inshore <35' (under 10.7 m)	Supplementary 35' - 64' 11" (10.7 m - 19.8 m)
EBITDA to Revenues	~20%	~25%
IQ - Transferable?	No	No
- Divisible?	No	No

As a result of the exceptionally high snow crab prices in 2004, the snow crab fleet achieved 20% or more EBITDA. The current rates of return may be higher or lower than those in 2004 given the current situation of relatively high landed prices, high fuel costs, lower costs due to buddy-up and combining, and changing catch rates and landed volumes.

Table 5.3 Newfoundland Snow Crab commercial fishing fleet profile 1980 to 2010

Year	Regulations*		Activity		Vessel Landings			Wholesale Value**	
	TAC tonnes (1)	Licences (2)	Active Vessels (3)	Vessel Deliveries (4)	Round tonnes (5)	\$ millions Value (6)	\$ per kg (7) = (6)/(5)	\$ millions (8) = (5)x(9)	\$ per kg (9)
1980	no TAC		56	3,335	9,414	5.2	0.56		
81	no TAC		52	4,417	14,196	7.7	0.54		
82	no TAC		62	3,717	13,499	8.0	0.60		
83	no TAC		64	3,861	11,114	10.4	0.94		
84	no TAC		68	3,732	9,556	6.9	0.72		
85	no TAC	132	200	5,451	7,975	6.9	0.86		
86	9,200	278	268	6,554	8,968	10.3	1.15		
87	8,400	330	256	5,129	6,681	12.6	1.88		
88	8,600	635	417	6,377	9,620	21.8	2.27		
89	10,100	694	471	5,087	8,326	10.3	1.23		
1990	10,500	711	426	5,373	11,027	13.1	1.19		
91	15,800	736	483	6,416	16,218	19.9	1.23		
92	14,500	741	413	4,875	16,437	13.0	0.79		
93	18,700	736	574	5,784	22,922	31.7	1.38	102.0	4.45
94	23,800	747	732	7,104	27,921	87.2	3.12	166.1	5.95
95*	31,900	1,160	1,227	13,403	32,343	176.2	5.45	265.2	8.20
96	37,700	2,570	2,497	23,135	37,969	96.8	2.55	169.0	4.45
97	44,500	2,910	2,808	26,062	45,746	91.8	2.01	203.6	4.45
98	49,200	3,278	2,937	29,248	52,626	102.1	1.94	231.6	4.40
99	61,800	3,296	2,899	35,193	68,896	235.4	3.42	420.3	6.10
2000	51,200	3,868	2,915	27,756	55,363	267.3	4.83	418.0	7.55
01	52,300	3,932	2,765	25,292	56,608	218.4	3.86	386.6	6.83
02	57,000	3,438	2,723	27,847	59,321	228.9	3.86	408.7	6.89
03	56,300	3,563	2,604	27,606	58,351	263.6	4.52	427.7	7.33
04	53,600	3,498	2,532	27,395	55,666	300.6	5.40	422.5	7.59
05	50,000	3,520	2,361	19,809	43,992	140.4	3.19	247.2	5.62
06	46,200	3,492	2,189	16,783	47,262	100.8	2.13	218.4	4.62
07	47,700	3,488	2,184	17,448	50,207	177.5	3.53	284.7	5.67
08	54,300	3,482	2,101	15,445	52,749	179.5	3.40	302.8	5.74
09	54,100	3,444	2,010	16,332	53,458	164.7	3.08	284.9	5.33
2010	56,100	3,439	1,948	16,072	52,223	155.4	2.98	289.8	5.55

* Fisheries Management Regimes - limited entry pre 1995, IQs 1995 onwards

** Export price for frozen sections - product price converted to round equivalent price based on conversion factor of 0.62 from whole weight to section weight

Source: DFO Newfoundland & Labrador, DFO Ottawa (for export prices from Statistics Canada)

6.0 Full Bay Scallops

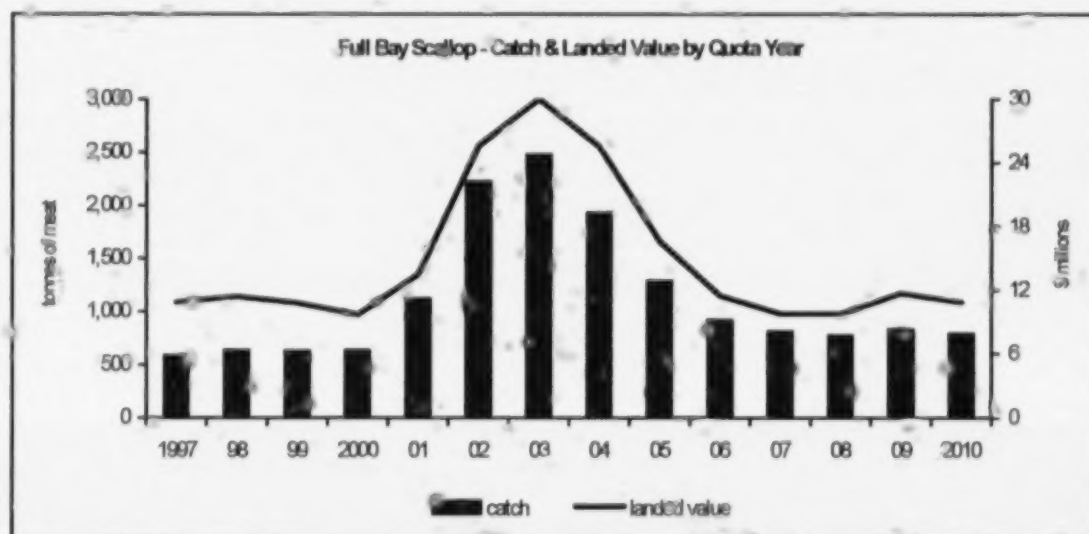
The commercial IQ scallop fishery which occurs in the Bay of Fundy Nova Scotia is a dredge fishery conducted by the Full Bay fleet using vessels of 13.7 m (45 feet) to 19.8 m (65 feet) feet in length.

The meat from the bivalve scallop is extracted or shucked onboard the vessel and delivered to the buyer/processor. The scallop meat is sold in fresh and frozen form to domestic Canadian and international markets, mainly the United States and France - see Table 6.2 and Canada Fisheries & Oceans (2010) for a profile of the fishery.

6.1 Management Regime

The Full Bay scallop fleet comprising 99 licences and vessels went to an Individual Quota (IQ) management approach in 1997. The initial IQ allocation formula was based on a DFO-approved industry proposal which used historical catch levels.

Chart 6.1 Catch and landed value of Full Bay Scallop by quota year from 1997 to 2010



Prior to 2007, owner-operator and fleet separation clauses were in effect. The licence holder had to be on the vessel while it fished and the licence holder had to be an individual and not an incorporated company such as a processing company (but licence holders could use substitute operators when approved by DFO for special circumstances).

In 2007 the Full Bay scallop fishery, at the request of industry, became exempt from owner-operator and fleet separation clauses. Thereafter many entities, including companies that hitherto had controlling interest in a Full Bay licence registered under an individual, confirmed themselves as the licence holder of record to DFO i.e., the transparency of the true ownership of licences improved.

The quota is attached to the licence and not to the individual or company licence holder named on the licence. Currently 16 of the 99 licences are held by First Nations.

At the IQ program outset in 1997:

- any permanent quota share transfer had to entail the whole IQ for that licence
- there was a limit of 2.5% permanent quota share per licence
- there was no limit on the amount of annual temporary quota transfers.

In 2010 any portion of a licence holder's quota share could be transferred to another licence while the remainder of the conditions remained the same.

When the whole permanent quota share on a licence has been transferred to another licence, that licence becomes what is referred to as a "zero quota licence". However, this licence can still participate in the Bay of Fundy scallop fishery through temporary (in-season) quota transfers. As a result the number of licences in the fleet remains at 99.

6.2 Business Outcomes

The Full Bay scallop fleet has experienced declining TACs and catches and a more or less constant landed price over the past decade (see graph previous page) - the result is that fleet landed value is less than half of what it was during the 2002-2004 period when there was an exceptional recruitment which usually occurs every 12 to 15 years.

The 2007 exemption from owner-operator and fleet separation restrictions and the 2010 provisions allowing partial transfers of quota on a permanent basis conferred greater flexibility to the fleet, and has permitted one entity to hold any number of licences.

The only financial information publicly available on Full Bay fleet economics refers to the year 2004 (DFO 2007) - the fleet landed value is much lower today as shown in Table 6.2.

Table 6.1 Performance & management measures in the Full Bay Scallop Fleet in 2004

Performance/Management	Full Bay Scallop Fleet 2004
EBITDA to Revenues	~20%
IQ - Transferable?	temporary & permanent
- Divisible?	temporary transfers only
- Limit on Holdings per Licence	No
- Temporary IQ?	
- Permanent IQ?	2.5% of TAC

The 2.5% limit on permanent holdings implies a minimum of 40 licences holding permanent quota (the remaining 59 licences would have zero quota but could transfer in quota temporarily). Note however that industry has requested that the 2.5% limit remain in place. Note also that an entity can hold more than 2.5% of the TAC through holding more than one licence.

The active licence count could expand from the current 70 or so to a number closer to the full 99 if some "zero quota licence" holders leased quota in season e.g., in response to increased resource abundance and a higher TAC.

Table 6.2 Full Bay Scallop commercial fishing fleet profile from 1997 to 2010

Year	Regulations ^a		Activity	Vessel Landings ^{a*}			Wholesale Value	
	TAC** tonnes (1)	Licences (2)	Active Licences (3)	Tonnes of Meat* (4)	\$ millions Value (5)	\$ per kg* (6) = (5)/(4)	\$ millions (7) = (4)x(8)	\$ per kg*** (8)
1997*	922	99	86	587	10.9	18.60	12.6	21.55
98	600	99	76	635	11.4	18.00	13.9	21.90
99	620	99	70	632	10.8	17.10	13.1	20.75
2000	647	99	65	636	9.7	15.30	12.1	19.10
01	921	99	58	1,121	13.5	12.10	18.3	16.30
02	2,212	97	67	2,226	25.6	11.50	32.5	14.60
03	3,246	99	78	2,476	30.0	12.10	37.3	15.05
04	2,725	99	83	1,928	25.5	13.20	30.8	16.00
05	1,601	99	85	1,288	16.6	12.90	25.5	19.80
06	1,020	98	79	919	11.5	12.50	18.2	19.55
07	883	100	76	815	9.8	12.00	14.3	17.55
08	811	97	67	778	9.8	12.60	12.7	16.30
09	816	99	70	830	11.7	14.10	14.9	17.90
2010	707	99	69	794	10.9	13.70	13.9	17.55

* Fisheries Management Regimes - limited entry pre 1997, IQs with transferability 1997 onwards

** Vessel landings and TACs refer to quota year of October to September (conversion factor of 8.3 from meat to whole scallops)

*** Export prices for scallop meat

Source: DFO Maritimes, DFO Ottawa (for export prices from Statistics Canada)

7.0 Gulf Shrimp

The commercial shrimp fishery in the Gulf of St. Lawrence is conducted by trawl vessels, mostly in the length range of 16.7 m (55 feet) to 27.4 m (90 feet), that deliver whole product to processing plants.

The major processed products are frozen cooked and peeled shrimp and frozen whole shrimp. The main export markets are the United States, the United Kingdom and European countries such as Denmark and Norway - see Table 7.3, Canada Fisheries & Oceans (2005) and Menard (2012) for a profile of the fishery.

7.1 Management Regime

The Gulf shrimp fishery is prosecuted by licence holders from Quebec, New Brunswick and Newfoundland. The fishery operates in four broad areas - Estuaire, Sept -Iles, Anticosti and Esquiman from west to east in the Gulf of St. Lawrence - each with a separate TAC.

In recent years, some new Gulf shrimp fleets have emerged (Prince Edward Island allocation, Nova Scotia allocation, new access). These new fleets operate under a separate fishery regime and are not considered in this analysis. This analysis focuses on the traditional fleet of 112 licences segmented by Group A and Group B components.

Table 7.1 Number of Gulf Shrimp Traditional Licence Holders by province of residence by licence class

Licence Class	Traditional Licence Holder Residence			
	Quebec	New Brunswick	Newfoundland	All
Group A*	7	0	46	53
Group B**	<u>38</u> ***	<u>21</u> ****	<u>0</u>	<u>59</u>
	45	21	46	112

* have access to 75% of TAC for Esquiman Channel

** have access to 25% TAC for Esquiman Channel plus 100% of TAC in other areas

*** includes 5 First Nation licences

**** includes 2 First Nation licences

The Group A licence holders agreed to an Individual Quota system in 1996 (each Group A licence holder from Newfoundland received the same quota 1.9323% of the TAC, each Group A licence holder from Quebec received the same quota 1.5877% of the TAC).

The Group B licence holders agreed to an IQ system in 1991 where the initial allocation was based on historical catch in the late 1980s (subject to a floor and a ceiling).

There are owner-operator and fleet separation restrictions for licences tied to vessels 65' (19.8 m) in length and under. The licence holder must be on the vessel while it is fishing and the licence holder must be an individual and not an incorporated company such as a processing company.

An exception to this policy was introduced in 2011 whereby Independent Core fish harvesters may hold licences in the name of their wholly-owned company (DFO 2011).

The owners of licences tied to vessels over 65' (19.8 m) can be legal entities other than individuals.

Under a strict owner-operator clause, there can be no quota transfer and consolidation of fishing privileges. In certain cases this has been relaxed.

For Group A, the 7 Quebec licence holders opted to allow temporary transfers of Individual Quota amongst themselves. The 46 licence holders from the West Coast of Newfoundland originally opted to prohibit the transfer of IQs on a temporary or permanent basis. However, they currently are eligible to combine.

For Group B, both temporary and permanent transfers are allowed:

- temporary transfers - an enterprise is allowed to transfer up to 37% of the IQ in the calendar year, an enterprise is allowed to hold by virtue of temporary transfers a maximum of 680.39 tonnes (1.5 million pounds).
- permanent transfers - an enterprise can transfer all or part of its IQ to another enterprise as long as each enterprise has no more than 2.4284% of the Group B shrimp quota and no less than 0.6311% of the Group B shrimp quota (or otherwise must sell its complete IQ).

No permanent transfers between licence holders in different provinces are allowed.

7.2 Business Outcomes

Over the past decade the Gulf shrimp fleet has experienced increased TACs and catches but decreased prices - fleet landed value has remained relatively constant.

Table 7.2 Performance and management measures in the Gulf Shrimp Fleet in 2010

Performance/Management	Gulf Shrimp Fleet 2010	
	Group A	Group B
EBITDA to Revenues*	~zero	~10%
IQ - Transferable?	temporary only (Quebec)	temporary & permanent
- Divisible?	Yes	partially
- Limit on Holdings per Licence - Temporary IQ?	No	No
- Permanent IQ?	not applicable	2.4284% of Group B TAC

* GSGislason estimates based on adjustments to unpublished fleet financial survey information provided by DFO Quebec Region

The Group A fleet, with less quota transfer opportunity, has lower EBITDA than the Group B fleet. Neither fleet comes close to the 25% EBITDA benchmark.

There has been only marginal consolidation of fishing operations, and the number of active vessels is very close to the number of licences for the non-First Nation fleets, for several reasons:

- physical limits of vessels and processing plants – e.g., plants need to schedule deliveries over the long April to September/October season to avoid gluts
- financial incentives – provincial incentives such as low interest loans and assistance, federal Employment Insurance (EI) system inhibit exit from the industry
- transferability restrictions – e.g., no interprovincial transfers of licences, no permanent transfers for Group A in Quebec, restrictive limits on permanent quota holdings in Group B, complications arising from the fleets operating in four different areas

The administrative rules on transferability reflect the expressed views of industry.

Table 7.3 Gulf Shrimp commercial fishing fleet profile from 1982 to 2010

Year	Regulations*		Vessel Landings			Wholesale Value	
	TAC tonnes** (1)	Licences (2)	Round tonnes** (3)	\$ millions Value (4)	\$ per kg (5) = (4)/(3)	\$ millions (6) = (3)x(7)	\$ per kg*** (7)
1982	12,900						
83	15,300						
84	16,300	109					
85	14,500	110					
86	12,100	121					
87	13,100	127					
88	13,100	127	14,083	24.1	1.71		
89	14,900	133	15,794	21.3	1.44		
1990	15,800	134	15,772	18.8	1.19	38.0	2.41
91*	16,600	134	16,555	23.0	1.39	41.2	2.49
92	16,600	134	12,979	17.8	1.37	35.2	2.71
93	16,600	134	15,547	21.0	1.35	42.3	2.72
94	16,600	131	16,508	21.6	1.31	38.3	2.32
95	16,600	128	17,374	27.6	1.59	50.7	2.92
96*	18,210	125	19,033	33.2	1.74	52.0	2.73
97	20,031	118	21,175	35.4	1.67	50.6	2.39
98	23,187	117	24,533	37.2	1.52	56.7	2.72
99	23,187	117	24,555	38.7	1.58	81.5	3.32
2000	25,969	117	27,540	41.4	1.50	73.3	2.66
01	28,800	115	24,936	31.5	1.26	61.1	2.45
02	28,800	114	29,470	36.7	1.25	68.1	2.31
03	27,710	112	27,685	35.6	1.29	57.3	2.07
04	35,334	112	35,975	43.5	1.20	72.0	2.00
05	36,183	112	30,831	37.7	1.22	55.5	1.80
06	36,183	112	34,544	31.5	0.91	56.3	1.63
07	36,184	112	36,407	35.3	0.97	62.6	1.72
08	36,902	112	35,666	40.1	1.12	71.0	1.99
09	37,016	112	35,343	35.3	1.00	73.1	2.04
2010	36,914	112	36,265	39.1	1.08	71.4	1.97

* Fisheries Management Regimes - limited entry pre 1991, IQs 1991 onwards for Group B, IQs 1996 onwards for Group A

** TACs and vessel landings include those by the new Gulf shrimp fleets (but the TACs & landings of the 112 traditional licence holders would comprise 90% or more of the totals)

*** Export prices for frozen peeled shrimp from Quebec - product price converted to round equivalent price based on conversion factor of 4.1 from cooked & peeled to whole shrimp

Source: DFO Quebec Region, DFO Ottawa (for export prices from Statistics Canada)

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ANNEX : Comments by Expert Reviewers

Subject experts were asked to review the current paper *IQ Fisheries in Canada: Linking Business Outcomes to Management Practices*. The review provided an additional level of consideration to contributions and analyses of the paper. Reviewers included fishery economists from the Department and academia, who were selected based on their familiarity with the case study fisheries and/or with individual quota management of fisheries. When read alongside the case studies, the reviewer comments invite the reader into a discussion about the effects of quota management in these six fisheries and methodological limits of the study.

Reviewer comments are summarized with respect to: the contributions of the paper to the evidence-based discussion on fishery quota; and the methodological approach of the authors to the case studies. Authors of comments are not identified to preserve the expected anonymity of the review process.

Contribution

Reviewer comments helped to confirm the contribution of the paper to the ongoing discussion of the effects of quota-based fishery management, as well as highlight some methodological issues that limit the scope of the conclusions. The six case studies demonstrate the breadth of variety in IQ management approaches in Canada and illustrate how fishing and business outcomes have changed in each fishery, both before and after the introduction of individual quota. In addition, the paper provides a useful example of how performance in diverse fisheries can be compared against a common annual business measure: return on earnings relative to the fishing revenues.

The background literature on quota management systems in fisheries primarily confirms that:

- *relative to open access, input restricted fisheries, or strictly aggregate output (TAC) regulated fisheries, individual quota-based output controlled fisheries are expected to result in reduced capacity and improved economic earnings, ceteris paribus (see also The Princes Charities 2012, Grafton et al 2006, Grafton and Lane 1998, Lane 1997);*
- *improved flexibility in transfers permits a wider expected range of economic performance and sustainability (Stephenson et al 1993, Scott 1996); and*
- *additional restrictions in transferability reduce the opportunities for fleet reduction and potential gains in sector economic performance (Lane 1999)*

The paper presents a contribution to the evidence-based discussion of the conditional impacts of quota-based fisheries management systems. This includes:

- 1) Definition of a specific annual business performance measure in the form of the EBITDA to Landed Value ratio.*
- 2) Establishment of an, albeit arbitrary, annual benchmark ratio "target" of 25% as an indicator of "business success".*
- 3) Annual application to a range of diverse, national, regional fisheries in order to compare the results against the commonly applied benchmark.*
- 4) General verification (consistent with the literature) of quota system dynamics based on aggregated evidence, e.g., observed reduction in numbers of active firms, improved average revenue per firm, etc.*
- 5) General intuitive verification (also consistent with the literature) that fewer restrictions on transferability in quota systems leads to greater exiting, more industry consolidation, and improved business performance.*
- 6) General conclusions relative to the performance of the selected case studies based on observed differences in their quota management operations.*

The development of a defined business indicator provides the simple means of comparing selected case studies, and their different performance results, to the shared and diverse attributes of the cases. As noted above, the uniqueness and complexity of the different fisheries makes it problematic to attribute measured performance differences directly to noted differences in quota management practices, e.g., flexibility on transferability. Ultimately, this information may be said to: (1) acknowledge intuitively verifiable aggregate results, e.g., quota-based systems earn more when distributed across fewer units/firms; and (2) suggest further research (in individual fisheries) to specify the implied cause and effect, and to test and develop a more complete suite of quantitative business support measures, enhanced review of issues, and focus on individual firm units and annual returns.

Case Studies and Methodology

Reviewers expressed concerns on whether the measure of business success was sufficiently accurate to allow for comparisons between the case studies. Concerns were expressed with the report defining business success as a 25% or more return in

earnings (specifically, EBITDA, or earnings before interest, taxes, depreciation and amortization). Reviewers viewed the target as somewhat arbitrary and not motivated within the report. In addition, a number of reviewers noted that in the case of transferable quota, leasing costs become an important cost consideration in business earnings. The EBITDA measure does not capture those costs and may lead to some distortions when comparing fisheries with different IQ regimes and rules around quota transferability.

Other concerns were raised about the comparability of earnings between fisheries. Earnings data for two Atlantic fisheries (Newfoundland Snow Crab; Full Bay Scallops) were limited to 2004, while data from other fisheries ranged from 2007 to 2010. Differences in earnings are also due to a number of factors including the type of markets for the species, demand, cyclical prices for energy and recent macroeconomic events such as the 2008–12 global recession beginning. Comparing earnings from different years and different commercial species fails to control for these factors and may distort the actual differences in earnings between fisheries.

A final consideration raised by reviewers is that the business measure EBITDA does not capture the prominent use of Employment Insurance (EI) in Atlantic fisheries. EI can provide fishers thousands of dollars of additional revenue and is likely a consideration in the fishers' overall business model. A more accurate comparison between the case studies would include estimates of EI revenues in the return on investment. Lower business measures for the East Coast could be at least partially explained by the role of EI in fisher revenues.

[C]omparison of operating performance among the selected case study fisheries based on the single-valued EBITDA benchmark indicator provides a less than complete picture of the dynamic performance of these diverse fisheries in their unique contexts. Indeed to consider all aspects affecting business performance is a complex task that does not lend itself to easy quantitative analysis and testing.

[N]ot knowing annual information on fisheries operating costs (probably considered as proprietary at the firm/company level for this cursory study) masks its independent time series, and the fuller explanation of the designated and arbitrary annual EBITDA to Landed Value benchmark of 25% (provided for each fishery for few selected years); operating costs components, e.g., labour (crew), fuel,

insurance, licencing, have direct and independently trending effects on business operating performance that explain, in part, business indicators[.]

On the measure of viability, the report uses an EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) of at least 25%. Even the author admitted that the benchmark viability used in the analysis is somewhat arbitrary[...]

In the Introduction, [the paper] states that in the calculation of EBITDA used, "the cost of leasing licences, quota and other fishing assets are not deducted as a cost".

Since one purpose of the EBITDA concept is to measure cash available as a return to capital, we are of the view that these leasing costs should be deducted from earnings as they are not available to return to capital.

This is particularly important in this report since this report is an attempt to link ITQs [Individual Transferable Quota] and other quota transferability options to improved financial performance. The approach used does not account for the often considerable costs of leasing quota and fishing assets which are a real cost of participating in ITQ fisheries. When these costs are very high they can negate the benefits of acquiring more quota.

The EBITDAs used in this report, to the extent of the magnitude of the lease costs not deducted from earnings, are overstated and this greatly affects their comparability across fisheries and over time.

It may well be true that that transferability of quotas can lead to higher returns by harvesting enterprises, but this is not necessarily the reason for the increased EBITAs seen in this report. For example, in the Pacific Halibut fishery, the EBITDA increase from 1991 to 1994 occurred during a period when the TAC increased by 36% and the price increased by 26%. It is thus unclear whether the EBITDA increase had anything to do with the new management regime or was simply a result of the TAC and price increases. As well, the EBITDA increase over time for Pacific Geoduck also coincided a price increase. In this case the price increase was a very high 560%.

[T]he annual fisheries business performance indicator is applied to the multiple operators in each fishery to determine an aggregate value for the fishery; individual fishery operators that may also be earning income from other fisheries and therefore may make conscious decisions to defer income in the designated quota fishery (thereby deflating the indicator in some years) independent of other indicators; the interpretation of the results may be different if multiple licence opportunities are exercised across the fishery case studies[.]

[S]hifting biological impacts on stock recruitment and productivity, as well as negative impacts on the resource that may be attributed to the quota management system, e.g., practices of high-grading, illegal, unreported, and unregulated (IUU) fishing activities (DFO 2009) and this require some consideration re impacts on business performance not considered in the paper; as well, the positive opportunities and improved resource status attributed to quota systems may, through pseudo property rights, invoke enhanced stewardship and improved resource sustainability (Ostrom 1990) that may in turn impact operating performance and would require recognition in each fishery and further elaboration[.]

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